68A1096 #267 CAUSTIC SCRUBBER for off GAS System

FILE COPY

OAK RIDGE NATIONAL LABORATORY

OPERATED BY

UNION CARBIDE NUCLEAR COMPANY

UCC

POST OFFICE BOX X
OAK RIDGE, TENNESSEE

April 12, 1960

U. S. Atomic Energy Commission
Post Office Box E
Oak Ridge, Tennessee

Attention: Dr. H. M. Roth

Gentlemen:

Subject: REQUEST FOR DIRECTIVE CR-292, "CAUSTIC SCRUBBER FOR OFF-GAS SYSTEM, BUILDING 3019"

References:

1. Oak Ridge National Laboratory General Plant Project 524-601-ORL23.
2. Preliminary Proposal 292, "Caustic Scrubber for Off-Gas System, Building 3019," dated April 12, 1960.
3. Letter, dated March 24, 1960, J. A. Swartout to H. M. Roth, "Cancellation of Directive CL-231 and Authorization of Additional Work on Radioactive Materials Containment in Radiochemical Pilot Plants,"

Attached is Preliminary Proposal 292, "Caustic Scrubber for Off-Gas System, Building 3019," which describes the installation required to prevent corrosive acid fumes and radioactivity from entering the off-gas duct from the Chemical Processing Pilot Plant, Building 3019, to Stack 3039.

It is requested that a directive be issued authorizing $10,000 for engineering from Fiscal Year 1960 General Plant Project funds. The design is tentatively scheduled for completion in June, 1960.

No action taken per oral request

3507

APR 14 1960

CR-2

ChemRisk Repository #1241

It is further requested that the construction portion of the project be authorized when additional General Plant Project funds are made available.

Sincerely yours,

J. A. Swartout
Deputy Director

JAS:CAB:mss

Enclosure: Preliminary Proposal 292

cc: C. E. Center
W. A. Bonnet
E. A. Bagley
F. L. Culler
W. L. Morgan
H. E. Seagren
R. B. Somers
Hezz Stringfield

OAK RIDGE NATIONAL LABORATORY

CAUSTIC SCRUBBER FOR OFF-GAS SYSTEM, BUILDING 3019

PRELIMINARY PROPOSAL
292

April 12, 1960

CONTENTS

CAUSTIC SCRUBBER FOR OFF-GAS SYSTEM, BUILDING 3019

This proposal describes equipment and accessories needed to remove corrosive acid fumes and radioactivity from process vessel off-gases before discharging the stream into an off-gas duct to Stack 3039.

A. References:

1. Oak Ridge National Laboratory General Plant Project 524-601-ORL23.

2. Request for Directive CR-292, "Caustic Scrubber for Off-Gas System, Building 3019," dated April 12, 1960.

3. Letter, dated March 24, 1960, J. A. Swartout to H. M. Roth, "Cancellation of Directive CL-231 and Authorization of Additional Work on Radioactive Materials Containment in Radiochemical Pilot Plants."

B. Justification of Basic Need:

Process vessel off-gases from the Chemical Processing Pilot Plant, Building 3019, are drawn through a pipeline to exhaust at Stack 3039. To prevent corrosive acid fumes and radioactivity from entering the long pipe duct to the stack, it is proposed to install a caustic scrubber to clean the off-gas air stream. Dissolution and other chemical reactions emit vapors which may carry entrained or gaseous radionuclides as well as acids. The purpose of the scrubber is to prevent escape of radioactive vapors during sparging and during short cooled fuel runs, especially I^{131}.

If process off-gases are scrubbed before leaving the building, any subsequent accident that results in leakage will be less serious with the radioactivity largely removed. Before entering Stack 3039, the off-gas streams are cleaned again as protection against release of radioactivity through the stack, even if a pressure surge should carry radioactivity through the scrubber and filters at Building 3019.

The capacity necessary to handle dissolution off-gases requires a large scrubber to provide the desired cleaning without introducing too much pressure drop.

Description:

Located at the southeast corner of the Chemical Processing Pilot Plant, Building 3019, the project will consist of a filter pit; a pump pit;

scrubber enclosure; a caustic scrubber and caustic storage tank; deep-bed filters; instruments and controls; and the necessary piping, valves, and pumps. The filter pit (about 9 feet square by 5 feet deep) for two deep-bed-type filters will be reinforced concrete with the upper three feet and the removable roof plugs being about 2 feet thick.

The pump pit, approximately 10 feet by 6 feet by 4 feet deep, will be reinforced concrete with floor slab and walls only as thick as required for structural support. The roof of the pit will have a concrete plug 1 foot thick for shielding.

The scrubber enclosure, approximately 8 feet by 7 feet by 38 feet, will be reinforced concrete with walls 2 feet thick extending to 11 feet above grade and 1-foot-thick solid concrete-block walls from that point to the top of the structure. The roof of the enclosure will have a 1-foot-thick concrete plug for shielding.

The caustic scrubber will be about 30 inches in diameter by 21 feet high; the caustic storage tank will have a capacity of approximately 650 gallons. All equipment and accessories in contact with radioactive fluids will be fabricated from stainless steel. The necessary utility services will be installed.

C. Preliminary Schematic Plans:

Drawing A - Plot Plan

Drawing B - Plan

Drawing C - Section "A-A"

Drawing D - Flow Sheet

D. Outline Specifications:

Materials and installation will conform to applicable building codes and to the Atomic Energy Commission design criteria.

E. Preliminary Estimate of Cost:

The total estimated gross cost of the project is (see accompanying estimate).....$113,000.

Less Material on Hand..... 7,000

Total Net Project Cost.....$106,000

SUMMARY

	Subcontract	UCNC	Total
Direct Construction Cost			
Site Preparation	500	-	500
Filter Pit	4,800	-	4,800
Pump Pit	2,000	-	2,000
Scrubber Enclosure	12,100	-	12,100
Process Piping	33,400	200	33,600
Service Piping	7,900	200	8,100
Electrical	300	100	400
Equipment	2,700	18,200	20,900
Instrumentation	-	10,200	10,200
*Engineering	-	7,500	7,500
Indirect Costs	-	3,600	3,600
Allowance for Contingency	6,300	3,000	9,300
Total Gross Project Cost	70,000	43,000	113,000
**Less Materials on Hand		7,000	7,000
Total Net Project Cost	70,000	36,000	106,000

*Net
**Packing Material for Scrubber, Lead Shielding, and Stainless-Steel Pipe.

UNIT COSTS

Not Applicable

F. ***Proposed Starting and Completion Dates:

	Start	Complete
Engineering		
Design and Inspection	4-60	11-60

	Start	Complete
Construction		
Contract	7-60	11-60
UCNC	7-60	11-60

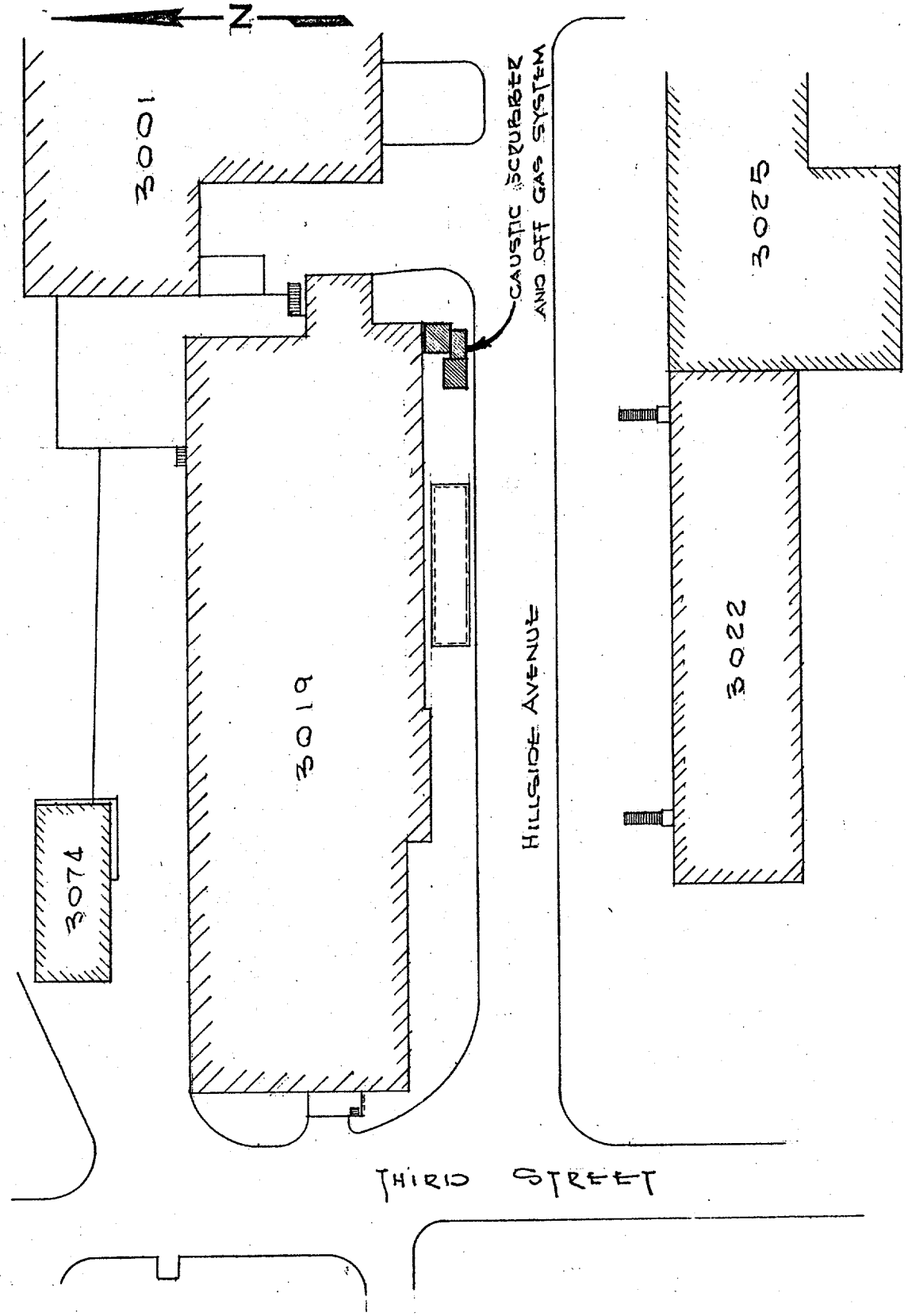
***Based on Receipt of Directive by April 15, 1960

G. Division of Work:

Union Carbide Nuclear Company will furnish engineering, fabricate and/or procure equipment, and furnish the equipment to subcontractor for installation; furnish on-hand materials to subcontractor; procure and/or fabricate and install instrumentation; and connect utilities. The construction of the concrete structure and the installation of equipment and accessories will be performed under a Union Carbide Nuclear Company subcontract.

H. Risks and Exposure Hazards:

The installation of this equipment will not create any abnormal hazards which would cause an explosion and result in injury to personnel or a release of radioactivity. The equipment will remove the possibility of excessive radioactive particles reaching the off-gas treating and disposal equipment at Stack 3039. The heavy concrete construction of the enclosures is to provide radiation shielding.



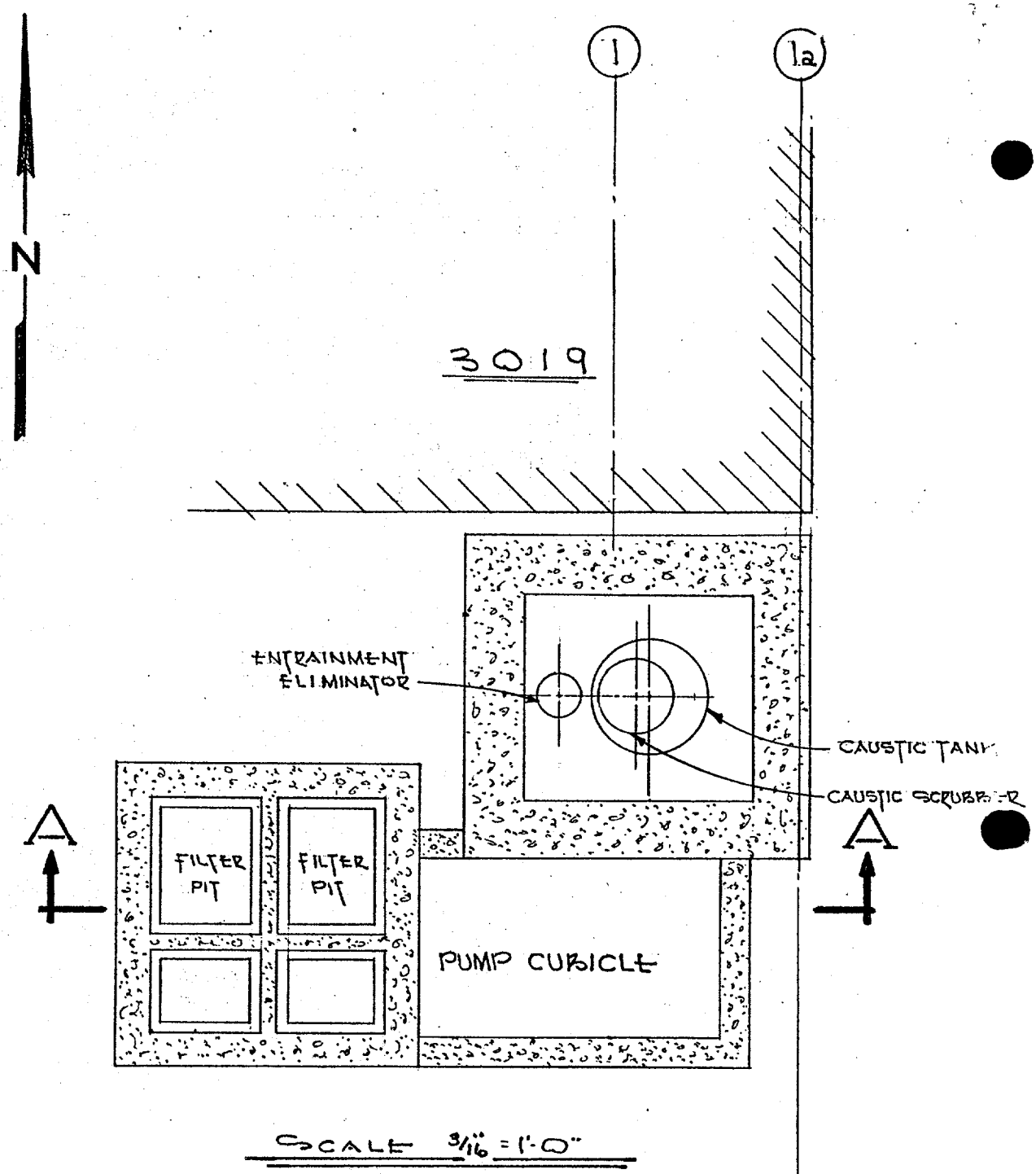
NOT CLASSIFIED

A-38921

PLOT PLAN

CAUSTIC SCRUBBER & OFF GAS SYS.

DRAWING A



SCALE 3/16" = 1'-0"

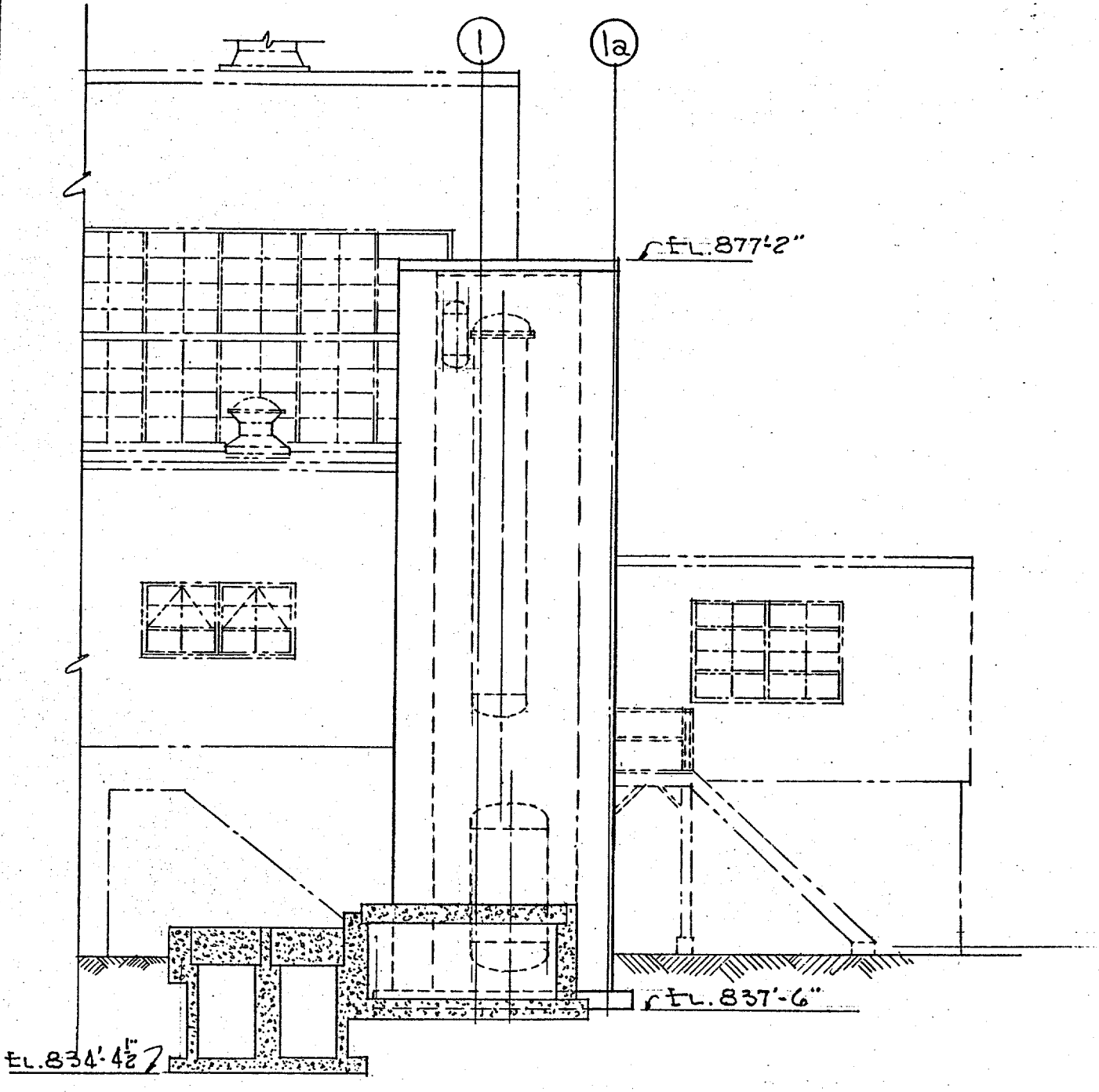
NOT CLASSIFIED

A-38922

PLAN

CAUSTIC SCRUBBER & OFF GAS S.S.

DRAWING B



SECTION "A-A"

SCALE 1/8" = 1'-0"

NOT CLASSIFIED

A-38923

SECTION 'A-A'

CAUSTIC SCRUBBER & OFF GAS SYS.

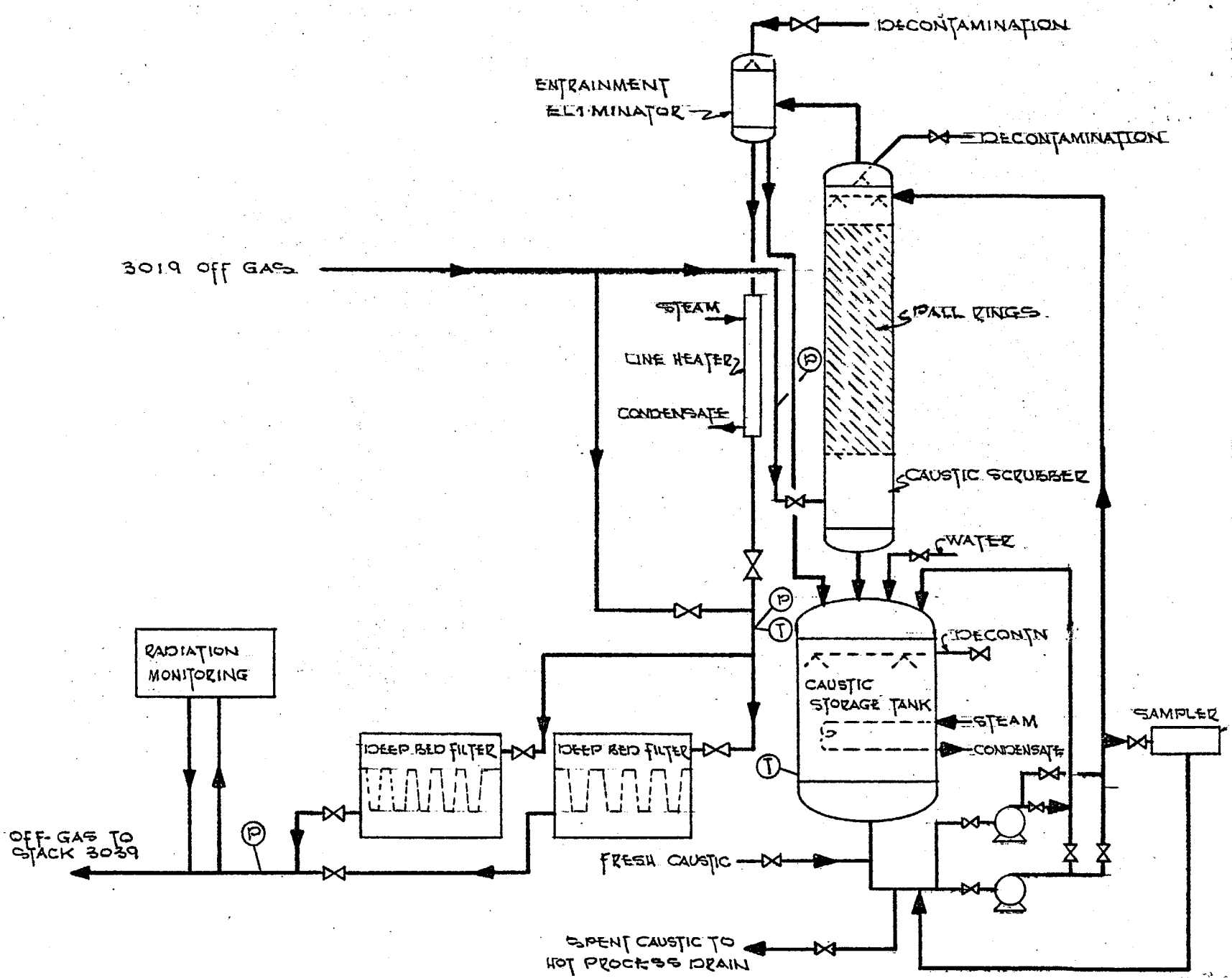
DRAWING C

NOT CLASSIFIED
A-38924

FLOW SHEET

CAUSTIC SCRUBBER & OFF-GAS SYS.

DRAWING ID



ESTIMATE

CAUSTIC SCRUBBER FOR OFF-GAS SYSTEM, BUILDING 3019

	Subcontract	UCNC	Total
Site Preparation			
Relocate Storm Sewer	500	-	500
Filter Pit			
Earthwork	200	-	200
Concrete	2,100	-	2,100
Floor Liner	600	-	600
Filter Racks and Filters	1,000	-	1,000
Sleeves	600	-	600
Paint	300	-	300
Sub-Total	4,800		4,800
Pump Pit			
Earthwork	200	-	200
Concrete	1,000	-	1,000
Heating	400	-	400
Paint	400	-	400
Sub-Total	2,000		2,000
Scrubber Enclosure			
Earthwork	300	-	300
Concrete	5,500	-	5,500
Concrete-Block Wall	1,500	-	1,500
Sleeves and Access Opening	3,300	-	3,300
Supports for Scrubber & Floor Lining	1,500	-	1,500
Sub-Total	12,100		12,100

	Subcontract	UCNC	Total
Process Piping	33,400	200	33,600
Service Piping			
Radioactivity Drains	3,200	-	3,200
Steam	900	-	900
Water and Air	300	-	300
Nitric Acid Decontamination	2,300	-	2,300
Radiation Monitoring	1,200	-	1,200
Connections	-	200	200
Sub-Total	7,900	200	8,100
Electrical	300	100	400
Equipment	2,700	18,200	20,900
Instrumentation		10,200	10,200
Engineering	-	7,500	7,500
Total Project Cost	63,700	36,400	100,100